# *Microgrids for Community Resilience Webinar*

Colorado Resilience Office
February 14th, 2023
2-3 PM MT

COLORADO
Resiliency Office
Department of Local Affairs

# *Welcome*

Please use the chat to communicate any questions for the panelists.

Ensure your microphone is on mute for the duration of the webinar.

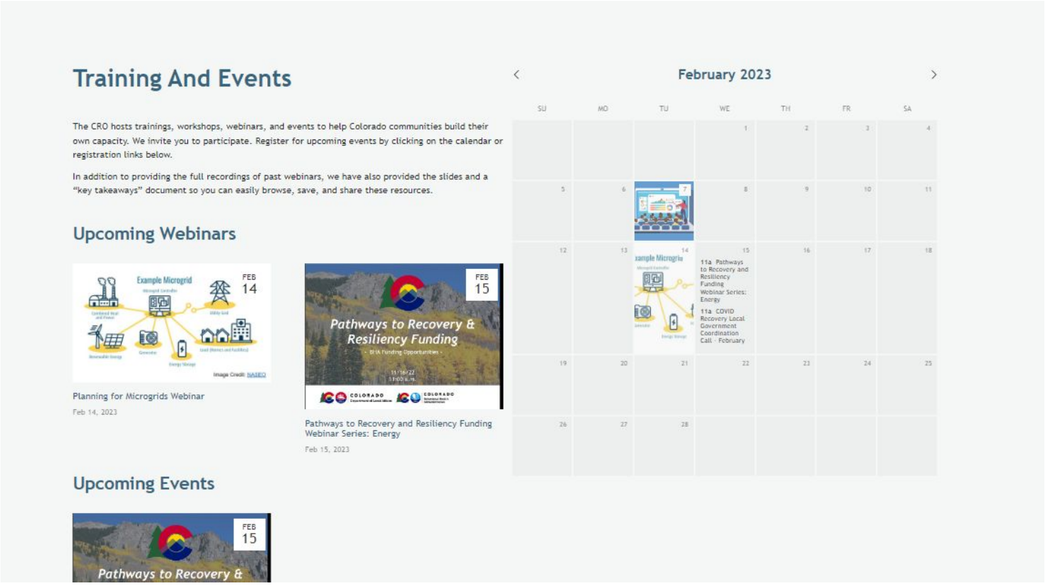
This webinar is being recorded and will be posted on the Colorado Resiliency Office's website: coresiliency.com/webinars

# *Agenda*

- CRO
  - Microgrids for Community Resilience (MCR) Program
  - Existing Colorado microgrid projects
- DOE CHP TAP representatives' presentation
  - About the CHP TAPs
  - About microgrids
  - Project Profiles
  - How to work with the CHP TAPs
- Upcoming microgrids technical assistance
- Q&A

# *CRO Climate Webinars Overview*

- **Held quarterly in 2023**
  - Continuation of series from 2021
    - Microgrid-related 2021 webinars on Energy Resiliency through Microgrids & San Miguel County Clean Energy Projects
- **Target Audience:** local governments & partners
- **Purpose:**
  - Colorado-focused education on solutions and actions that can be taken to address climate change



# Local Funding Guide

## Local Community Funding Guide

Category: Energy Water & Environment (1)

Program

Award Type

Type of Funding

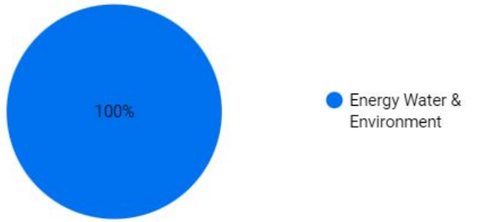
Agency

Eligibility

Clear Filters

Total Current Funding Opportunities

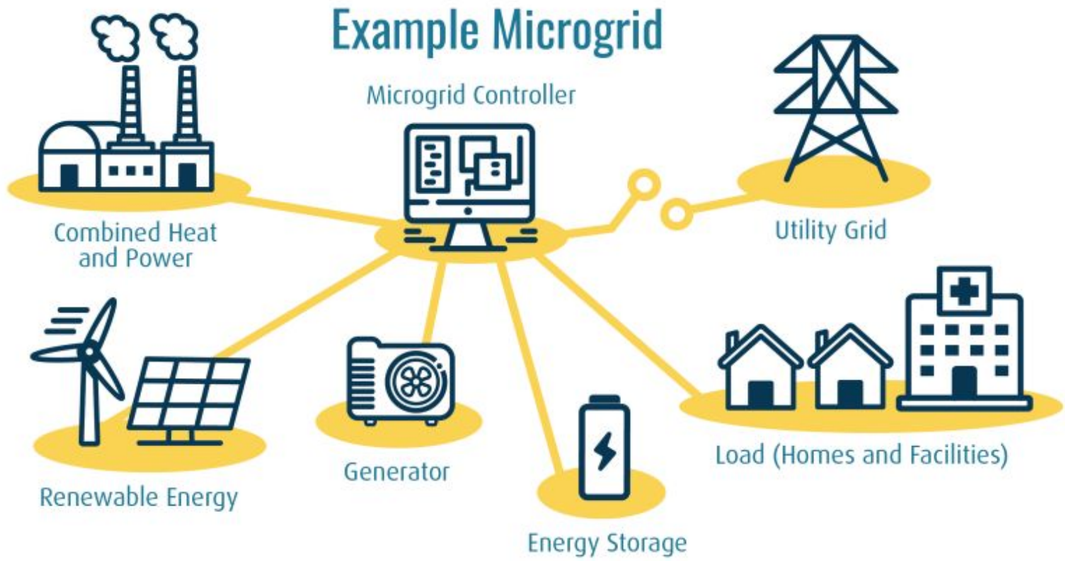
19




| Funding Category | Award Type | Agency | Program | Funding Type | Eligible Groups | Application Availability | Application Deadline |
|---|---|---|---|---|---|---|---|
| Energy Water & Environment | Infrastructure Investments and Jobs Act (IIJA) | Department of Energy | Energizing Rural Communities Prize | Grants | Local Governments | February | - |
| Energy Water & Environment | American Rescue Plan Act | Department of Natural Resources | Federal Technical Assistance Grants | Technical Assistance | Local Governments, Municipalities, Counties, Districts, Nonprofits, Private Entities | Check Program information | - |
| Energy Water & Environment | American Rescue Plan Act | Colorado Energy Office | Energy Office Weatherization Assistance Grants: SB21-231 | Grants | Individuals | Check Program Information | - |
| Energy Water & Environment | - | Colorado Water Conservation Board | Water Project Loan Program | Loans | Local Governments, Nonprofits, Water Entities, Public Entities, Private Entities | Rolling, Annual | - |

# *What is a microgrid?*

The Department of Energy defines a microgrid as “a group of interconnected loads and distributed energy resources within clearly identified electrical boundaries that acts as a single controllable entity with respect to the grid.”



| | MCR Planning Grants | MCR Construction/ Implementation Grants |
|---|---|---|
| **Application Period** | Feb 6 - March 31, 2023 | Expected mid-2023 |
| **Max Award** | $36,000 | $1,005,000 |
| **Match Requirement** | 25% - cash match required | 33% - in-kind contributions eligible |
| **Appropriated for Year 1** | $399,000 | $1,295,261 |
| **Purpose** | Grants can apply for funds for engineering, planning, pro forma, or feasibility/scoping studies to develop/explore new microgrid facilities. | Grants can apply for funds to develop new microgrid facilities, including shovel-ready projects. Priority will be given to projects leveraging pre-existing assets |

# *Microgrids in Colorado*

## Red Feather Lakes (Poudre Valley REA)

- Town with one transmission line installed $1.5M microgrid system:
  - a 140-KW, 446-KWh Tesla Powerpack battery,
  - 8-KW of solar photovoltaic,
  - and a 130-KW propane generator.
- Resiliency and emergency response supported for remote community
- Developed through local, regional, and national partnership, and included funding from NREA, DOE, and others

# *Microgrids in Colorado*

## Pitkin County

- Funded partially through DOLA (RENW EIAF grant), who awarded $1.7M
  - Total project estimated to cost $3.4M
  - Engineering study estimates batteries capable of storying 6 to 8 Mw, implementation of 1Mwh of battery storage and integration of Pitkin Solar away
- Solar energy-based project is centered around the Aspen Business Center and includes the county, the Aspen airport, the Roaring Fork Transportation Authority and Holy Cross Energy

# *Microgrids in Colorado*

## San Miguel Power Association Microgrids

- Funded through DOLA, who awarded $1.1M to build two solar PV and energy storage microgrid systems
- System connected two crucial parts of the San Miguel County sheriff's department: the annex building in Norwood and the Ilium sheriff office near Telluride.
- This project centered around mission-critical loads (building lighting, receptacles, communications and internet, control rooms, IT servers and radio rooms, and protective custody and lock systems)
- Find out more at the Climate Webinar: San Miguel County Clean Energy Projects

# Microgrid for Community Resilience Program

**Feb 14, 2023**

COLORADO
Department of Local Affairs

CHP Technical Assistance Partnerships
UPPER-WEST

CHP Technical Assistance Partnerships

# CHP TAP Representatives

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# Agenda

- About the CHP TAPs
- About Microgrids
- Project Snapshots
- How to work with the CHP TAPs

# About the CHP TAPs

# DOE CHP Technical Assistance Partnerships (CHP TAPs)

- End User Engagement
  Partner with strategic End Users to advance technical solutions using CHP as a cost effective and resilient way to ensure American competitiveness, utilize local fuels and enhance energy security. CHP TAPs offer fact-based, non-biased engineering support to manufacturing, commercial, institutional and federal facilities and campuses.
- Stakeholder Engagement
  Engage with strategic Stakeholders, including regulators, utilities, and policy makers, to identify and reduce the barriers to using CHP to advance regional efficiency, promote energy independence and enhance the nation's resilient grid. CHP TAPs provide fact-based, non-biased education to advance sound CHP programs and policies.
- Technical Services
  As leading experts in CHP (as well as microgrids, heat to power, and district energy) the CHP TAPs work with sites to screen for CHP opportunities as well as provide advanced services to maximize the economic impact and reduce the risk of CHP from initial CHP screening to installation.


www.energy.gov/chp

# DOE CHP Technical Assistance Partnerships (CHP TAPs)

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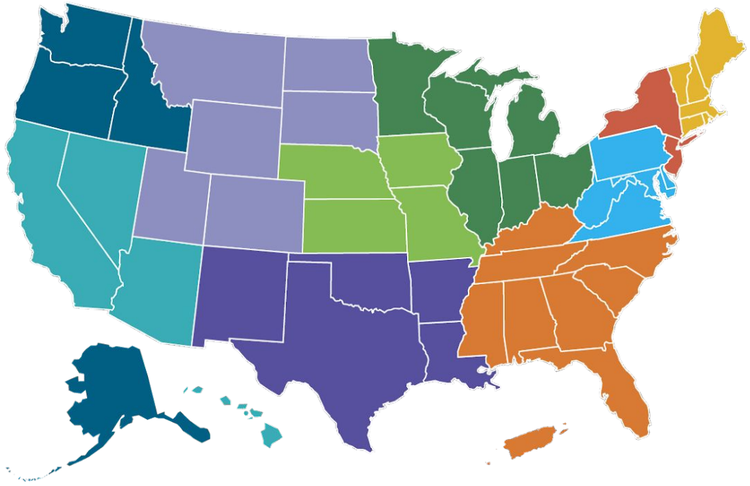

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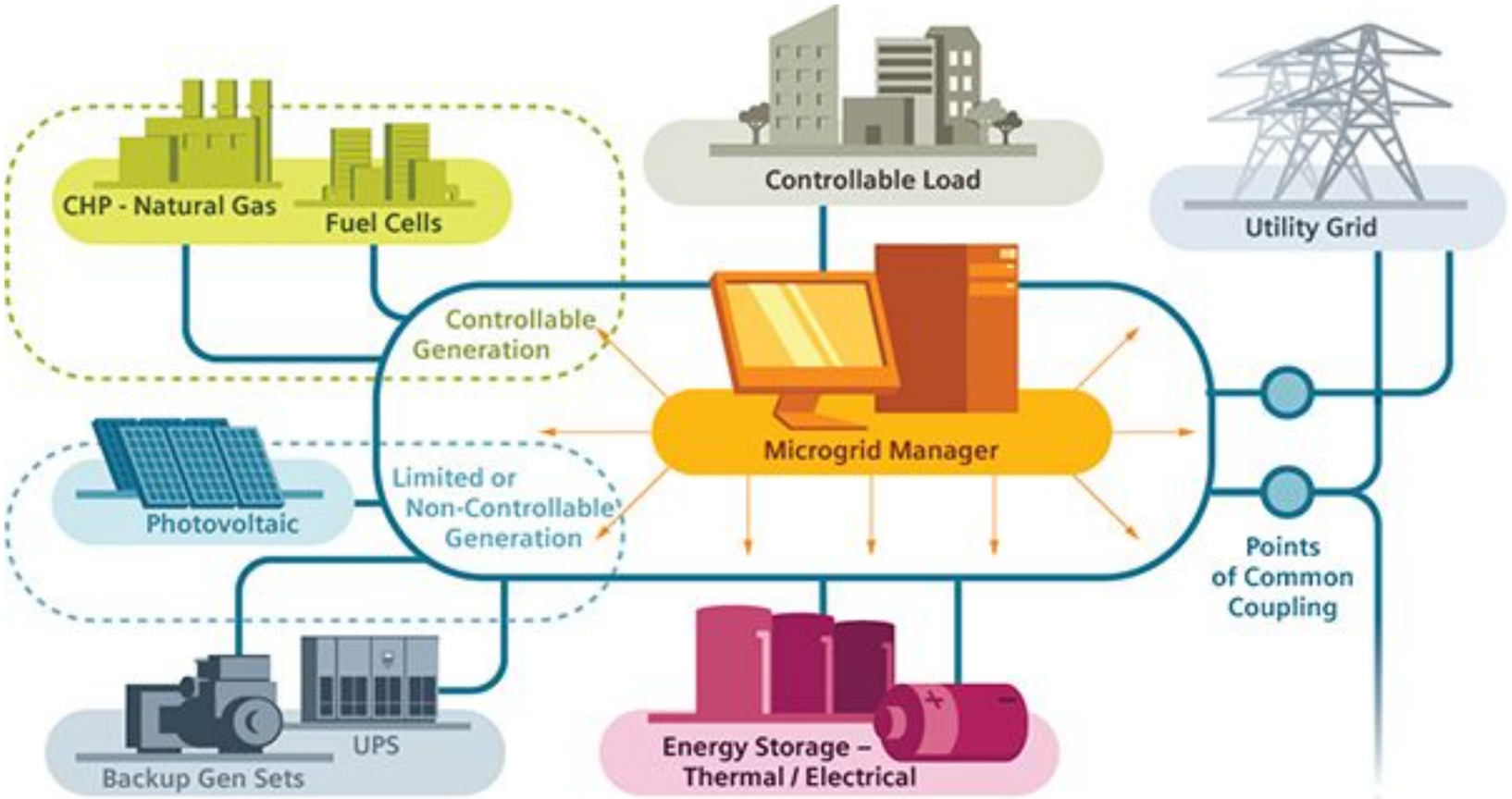
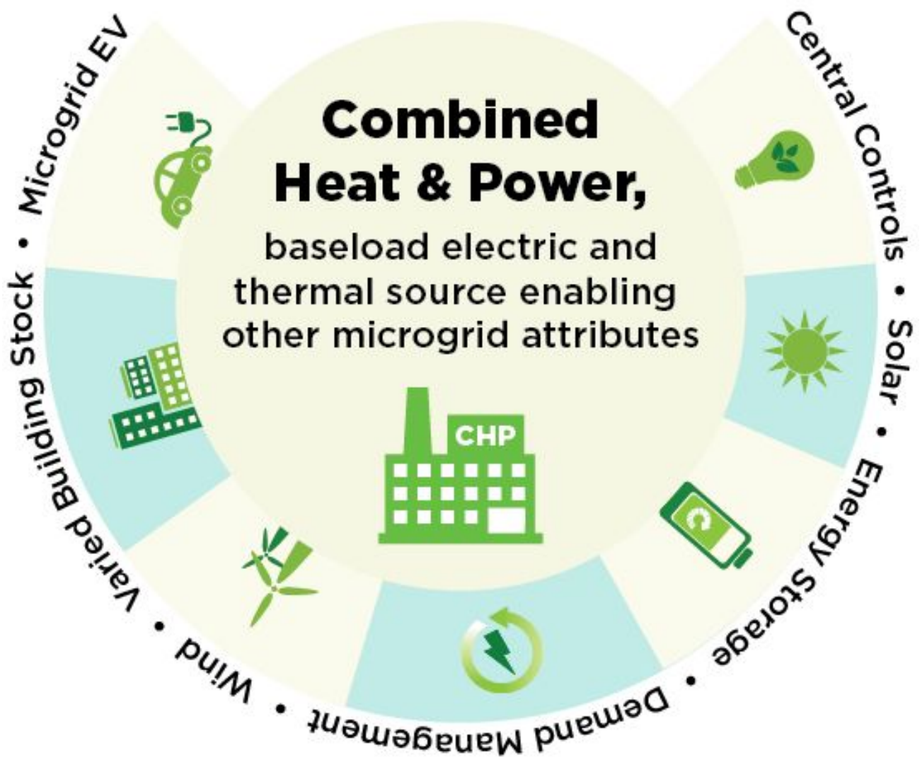
# About Microgrids

# Microgrids Can Incorporate Many Technologies



# CHP Can Enable Other Microgrid Technologies




- With a CHP system providing baseload electric and thermal energy, microgrids can add:
  - Solar and wind resources
  - Energy storage
  - Demand management
  - Central controls
  - Electric vehicle charging
- Flexible CHP systems can ramp up and down as needed to balance renewable loads and provide grid services

# DER Technologies Work Better Together in Microgrids

- CHP can work together with PV, wind, energy storage, and other technologies in resilient microgrids with diverse resources and multiple value streams
  - Active management system with programmable logic controllers to strategically utilize all microgrid resources
- Compared to a single DER technology, a microgrid with multiple DERs can provide:
  - Stronger resilience
  - Higher operational flexibility
  - More use cases
- ***For utilities***, microgrids can offer locational value, increased grid reliability, power quality, ancillary services, and demand response functionality
- ***For end users***, microgrids provide reliable and resilient power with the potential for energy and emissions savings

# Project Snapshots

# Recent Projects Supported in Colorado

- Municipal buildings (1)
- Greenhouse facilities (2)
- Waste Heat to Power for Oil and Gas (4)
- Wastewater Treatment Plants (1)
- Multifamily building (1)
- Commercial building (1)
- Manufacturing plants (3)
- Recreation Centers (2)
- Military campuses (2)
- Hotels and Resorts (2)

# Colorado College
## Colorado Springs, Colorado

COLORADO COLLEGE

### Project Snapshot:
### CHP Microgrid

| | |
|---|---|
| **Application** | College/University |
| **Capacity** | 245 kW (130 kW CHP + 115 kW PV solar) |
| **Prime Mover** | Microturbine |
| **Fuel Type** | Natural Gas |
| **Thermal Use** | Space Heating |
| **Installation Year** | 2017 |

The CHP microgrid system enables the library to save $83,000 per year in utility bills.

**Project Highlights:** The Tutt Library at Colorado College built what is believed to be the first net-zero academic research library in the United States. The CHP component of this microgrid provides the library additional resilience and lower operating costs.

**Upper-West CHP TAP** - https://chptap.lbl.gov/profile/45/ColoradoCollege-Project_Profile.pdf

### Project Testimonial

"This project put into motion years of planning and actions intended to reduce Colorado College's carbon footprint, and it has redefined our approach to achieving high-performance buildings by emphasizing collaboration and communication at all levels."
– Mark Ferguson, Campus Operations & Plant Manager

# New Belgium Brewery

## Fort Collins, Colorado

### Project Snapshot:
### Opportunity Fuel Utilization

| | |
|---|---|
| **Application** | Beverage and Tobacco |
| **Capacity** | 290 kW |
| **Prime Mover** | Reciprocating Engine |
| **Fuel Type** | Digester Biogas |
| **Thermal Use** | Digestion process |
| **Installation Year** | 2014 |

New Belgium Brewery process water treatment plant with aerobic and anerobic digestion.

**Project Highlights:** New Belgium uses its own wastewater to produce methane which powers two CHP engines that power brewery processes.

**Project Testimonial**

"Creating energy from our process water treatment plant is great because the fuel is created by a waste product. If you have the ability to use a free fuel source, it makes sense to take advantage of it."
- Jenn Orgolini, Sustainability Director, New Belgium Brewing Company

# Public Safety Headquarters

## Gaithersburg, Maryland

### Project Snapshot:
### CHP Microgrid

| Application | Government Buildings |
|---|---|
| Capacity | 865 kW |
| Prime Mover | Reciprocating Engine |
| Fuel Type | Natural Gas |
| Thermal Use | Heating and hot water |
| Installation Year | 2018 |

**Project Highlights:** Following a 2012 derecho which left buildings across Montgomery County without power for days, the county decided to invest in a CHP + solar microgrid to replace existing standby generators.

The CHP system is accompanied with 2 MW of solar capacity. The combined solar and CHP capacity allows the facility to maintain an infinite backup capacity. *Photo courtesy of Montgomery County.*

**Project Testimonial**

"On a typical operating day at the PSHQ advanced microgrid, the combined heat and power system can provide up to 70% of the site's energy from CHP with the remainder from on-site solar with very little utility power."
- Eric Coffman, Chief – Office of Energy and Sustainability, Montgomery County

**Mid-Atlantic CHP TAP** - https://chptap.lbl.gov/profile/135/MoCoPublicSafetyHQ-Project_Profile.pdf

# Burlingame Wastewater Treatment Plant

**Burlingame, CA**

## Project Snapshot:
## 177 kW Biogas CHP System

| Application | Wastewater Treatment Plant |
|---|---|
| Capacity | 177 kW |
| Prime Mover | Reciprocating Engine |
| Fuel Type | Biogas |
| Thermal Use | Digester Heating |
| Installation Year | 2006 |

The facility's treatment capacity peak flow is 5.5 million gallons per day (MGD) during normal operations and up to 16 MGD during wet weather operations.

**Project Highlights:** The generator currently supplies approximately 20% of the WWTP's electrical load. Renewable energy and NOx reduced 42% below limits. Total project costs, $912,000. Annual Energy Savings: ~$92,000. Incentive: $160,000. PAYBACK: 8 years

"The Burlingame WWTF has been a pioneer in the effective way to run a public-private partnership for wastewater treatment operations since 1972. We view our commitment to CHP and innovative biosolids management as an extension of that work."
-William Toci, Plant Manager

# St. Helena Hospital

## St. Helena, California

### Project Snapshot: Fuel Cell

| Application | Hospital |
|---|---|
| Capacity | 400 kW |
| Prime Mover | Fuel Cell |
| Fuel Type | Natural Gas |
| Thermal Use | Space heating, hot water, steam & sterilization |
| Installation Year | 2010 |

**Project Highlights:** The fuel cell at St. Helena Hospital produces 63% of the hospital's electricity requirements. During the summer, the fuel cell can provide 100% of the hospital's thermal loads. The system operates at capacity non-stop to provide energy to the hospital.


St. Helena Hospital's fuel cell offsets 665 tons of $CO_2$ and 2.1 tons of $NO_x$ annually, while saving the hospital $170,000 in avoided energy costs.

### Project Testimonial

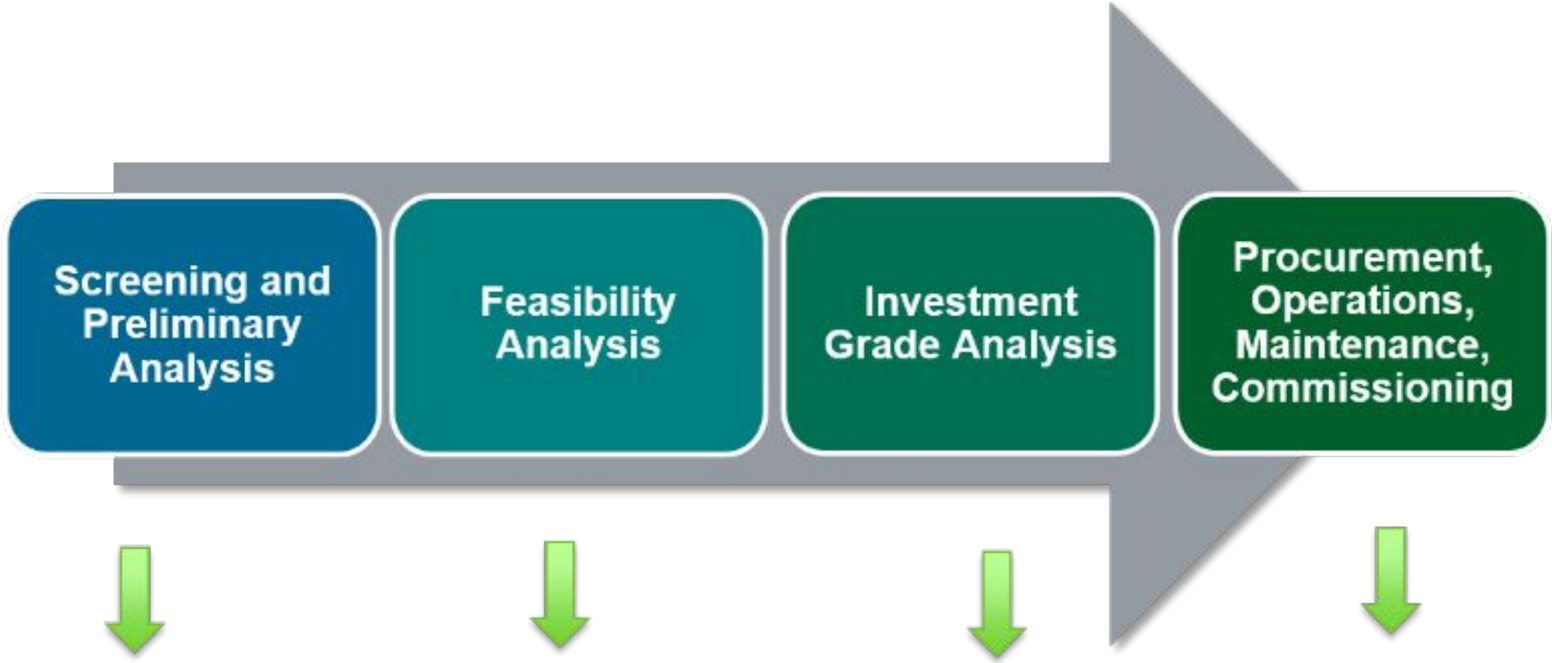
"Fuel cells are a great choice for businesses that have 24/7 operational needs and the capability to maximize utilization of both the power and the heat generated. They are very efficient with a potential to achieve 60%+ when all of the waste heat is utilized."

- Stan Tempchin, Director of Facilities, St. Helena Hospital

**Western CHP TAP** https://chptap.ornl.gov/profile/215/st-helena-hospital.pdf

# How to work with the CHP TAPs

# CHP TAP Role: Technical Assistance



# Site Survey

## Site Questionnaire - CHP Qualification

| | | | | |
|---|---|---|---|---|
| **Facility Name** | | | Date: | |
| **Site Contact** | Contact Name: | | Phone No.: | |
| | Title: | | Fax: | |
| | Email Address: | | | |
| **Project Location** | City: | | | |
| | State: | | Region: | |

### General

Facility Use

Motivation for CHP

### Site Qualification Questions (Yes/No)

| | | Comments |
|---|---|---|
| | 1. Are you concerned about the impact of current or future energy costs on your business? | |
| | 2. Are you concerned about power reliability? Is there a substantial financial impact to your business if the power goes out for 1 hour? For 5 minutes? History of blackouts? | |
| | 3. Do you have thermal loads throughout most of the year (incl. steam, hot water, chilled water, hot air, etc.)? | |
| | 4. Does your facility have an existing central heating or cooling plant? | |
| | 5. Do you expect to replace, upgrade, or retrofit central plant equipment within the next 3-5 ye | |
| | 6. Do you anticipate a facility expansion or new construction project within the next 3-5 years? | |
| | 7. Have you already implemented energy efficiency measures and still have high energy costs? | |
| | 8. Are you interested in reducing your facility's impact on the environment? Does your plant have any specific environmental targets or goals? | |
| | 9. Do you have access to on-site or nearby low cost fuel resources (i.e. landfill gas, farm manure, food processing waste, etc.)? | |

# Site Survey Cont.

**Site Data Collection**

| | |
|---|---|
| 1. How many hours per year does the facility operate? (hours) Or, ask about operating schedule - day/week, hours/day | |
| 2. What is your average power demand during operation? (kW), or | |
| 3. How much electricity do you use in a year, kWh? | |
| 4. What is your facility's primary thermal load (i.e., DHW, steam/HW space heating, process steam, cooling, etc.) | |
| 5. What is your average thermal demand? (MMBtu/hr), or | |
| 6. How much fuel (gas/oil/etc) do you use in a year? (MMBtu/yr, Therms/yr, etc.) | |
| 7. What is your current fuel price? ($/MMBtu) | |
| 8. How much do you pay for fuel annually? (Dollars/yr) | |
| 9. What are the CHP Fuel Costs? ($/MMBtu) | |
| 10. What is your average electricity price? ($/kWh) | |
| 11. How much do you pay for electricity annually? (Dollars/yr) | |
| 12. What is the efficiency of your existing boiler(s)/thermal equipment? (%) | |
| 13. What is the efficiency of your existing chillers? (kWh/ton) | |

Notes:

# Preliminary Analysis for Heating

**DOE TAP CHP Screening Technical Assistance**

**Gas Fueled CHP - Recip Engine, Microturbine, Fuel Cell or Gas Turbine Systems / natural gas, LFG, biogas**

***Note: The results of this screening analysis use average values and assumptions and should not be utilized as an investment grade analysis.***

User Input Cells

Data from Site Survey or Utility Bill Analysis

**Facility Information**

| | |
|---|---|
| Facility Name | |
| Location (City, State) | |
| Application | |
| Date: | |

**Loads**

| | | |
|---|---|---|
| Site Operating Schedule | 16/5 | Site operating schedule (i.e., 24/7, 24/5, 16/7, 16/5 or Other) - Utility Bills Analysis worksheet |
| Annual Operating Hours of Site | 4,160 | |
| Average Power Demand, kW | 1,617 | Average power demand during year - Utility Bills Analysis worksheet |
| Annual Site Electricity Consumption, kWh | 6,728,000 | Total annual site electricity use (from electric bills) - Utility Bills Analysis worksheet |
| Total Annual Thermal Demand, MMBtu/yr | 5,213 | Annual site thermal use (based on fuel bills) - Utility Bills Analysis worksheet |
| Average Hourly Thermal Demand, MMBtu/hr | 1.25 | Annual site thermal use / annual site operating hours - Utility Bills Analysis worksheet |
| CHP Operating Schedule | 12 Months | Schedule selected on Utility Bills Analysis worksheet |
| Annual Hours of CHP Operation | 4,160 | Hours with thermal loads conducive to CHP - Utility Bills Analysis worksheet |
| Average Power Demand during CHP Operation, kW | 1,617 | Utility Bill analysis worksheet |
| Electricity Consumption during CHP Operation, kWh | 6,728,000 | Annual site electricity use during CHP operating hours - Utility Bills Analysis worksheet |
| Thermal Demand during CHP Operation, MMBtu/yr | 5,213 | Utility Bill analysis worksheet |
| Avg CHP Addressable Thermal Demand, MMBtu/hr | 0.26 | From User Selection on Utility Bill Analysis Worksheet - Sets CHP Sizing **(can be over-ridden)** |
| Annual CHP Addressable Thermal Demand, MMBtu/yr | 1,077 | Addressable Thermal Load by CHP System - Utility Bills Analysis worksheet |

Addressable Thermal Load (MMBtu/hr)

| 12 Month Thermal | Winter Thermal | Shoulder Thermal | Summer Thermal | |
|---|---|---|---|---|
| 1.25 | 2.81 | 0.87 | 0.49 | Avg Load |
| 4160 | 1,026 | 2,086 | 1,049 | Hours |

**Energy Costs**

| | Base Case | CHP Case | |
|---|---|---|---|
| Boiler/Thermal Fuel Costs, $/MMBtu | $5.30 | $5.30 | |
| CHP Fuel Costs, $/MMBtu | | $5.30 | |
| Average Electricity Costs, $/kWh | $0.140 | | Annual electricity costs (demand and commodity) divided by annual kWh |
| Percent Average per kWh Electric Cost Avoided | | 90% | Option 1 - Percent of average electricity costs per kWh saved by one kWh of CHP electricity - typically 70 to 95% **(set to zero if using Option 2)** |
| Standby Rate, $/kW | | | Option 2 - Monthly $/kW standby charge based on CHP system capacity (**set to zero if using Option 1**) |
| Excess Power Sales Price, $/kWh | | | |

**Existing System**

| | | |
|---|---|---|
| Displaced Thermal Equipment Efficiency, % | 75.0% | Displaced onsite thermal (boiler, heater, etc.) efficiency **(can be over-ridden)** |

**CHP System**

| | | |
|---|---|---|
| Sales of Excess Power (Yes/No) | No | |
| Net CHP Power, kW | 44 | Default based on thermal match, but capped at average power demand unless excess power is allowed |
| CHP Electric Effiiciency Rate, % (HHV) | 29.3% | |
| CHP Electric Heat Rate, % (HHV) | 11,630 | |
| CHP Thermal Output - unfired, Btu/kWh | 5,829 | |
| CHP Thermal Output - unfired, MMBtu/hr | 0.26 | May be less than CHP Addressable Thermal Demand (C30) due to Electric Capacity Cap (E47) |
| Duct Burner Used (Yes/No) | No | Drop down - must enter yes or no |
| Duct Burner Thermal Output (Avg Annual), MMBtu/hr | 0.00 | Avg Addressable Thermal Load (C30) - Unfired CHP Thermal Output (E50) |
| CHP Fuel | Nat Gas | |
| Duct Burner Efficiency, % | 95% | Enter value if Duct Burner Used = Yes Typically 92 to 88% |
| CHP Availability, % | 95% | Typically 93% for recip engines, 95% for microturbunes and gas turbines |
| Incremental O&M Costs, $/kWh | $0.024 | |
| Unfired Thermal Utilization, % | 100% | Amount of CHP available thermal captured and used - typically 80 to 100% - Utility Bills Analysis worksheet **(can be overridden)** |
| Total Installed Costs, $/kW | $3,300 | |

# Preliminary Analysis for Heating Cont.

| Annual Energy Consumption | Base Case | CHP Case |
|---|---|---|
| Purchased Electricity, kWh | 6,728,000 | 6,552,500 |
| Generated Electricity, kWh | 0 | 175,500 |
| Generated Electricity Used on Site, kWh | 0 | 175,500 |
| Generated Electricity Sold, kWh | 0 | 0 |
| On-site Boiler/Heater Thermal, MMBtu/yr | 5,213 | 4,190 |
| CHP Thermal Used, MMBtu/yr | 0 | 1,023 |
| Duct Burner Thermal, MMBtu/yr | 0 | 0 |
| Total Thermal, MMBTu/yr | 5,213 | 5,213 |
| Boiler/Heater Fuel, MMBtu/yr | 6,951 | 5,587 |
| CHP Fuel, MMBtu/yr | 0 | 2,041 |
| Duct Burner Fuel, MMBtu/yr | 0 | 0 |
| **Total Fuel, MMBtu/yr** | ***6,951*** | ***7,628*** |

| CHP Fuel Use Efficiency | |
|---|---|
| 175,500 | CHP Electricity, kWh |
| 599 | MMBtu Electricity |
| 1,023 | MMBtu Used Thermal |
| 2,041 | MMBtu CHP Fuel |
| 79.5% | CHP Fuel Use Efficiency (HHV) |
| 0.59 | Power to Heat Ratio |

| Annual Operating Costs | | |
|---|---|---|
| Purchased Electricity | $941,481 | $919,379 |
| Standby Charges (Option 2) | $0 | $0 |
| On-site Boiler/Heater Fuel | $36,871 | $29,636 |
| CHP Fuel | $0 | $10,827 |
| Duct Burner Fuel | $0 | 0 |
| Incremental O&M | $0 | $4,212 |
| **Total Operating Costs** | ***$978,352*** | ***$964,053*** |
| Excess Power Sales | | *$0* |
| **Operating Savings** | | ***$14,299*** |

The purpose of this screening tool is to determine if a feasibility analysis should be undertaken. The system performance and financial data is based on rules of thumb and estimates of addressable thermal demand (heating/DHW) only during site operating hours. These results are not to be used for financial and/or project decisions other than whether to proceed to a more detailed feasibility analysis.

| Simple Payback | | |
|---|---|---|
| CHP Installed Costs | | $146,546 |
| Additional Costs | | $0 |
| Federal Investment Tax Credit (Yes/No) | Yes | ($14,655) |
| Avoided Equipment Credits* | | $0 |
| Total Installed Costs with Equipment Credit | | $131,891 |
| Incentives** | | $0 |
| Total Installed Costs less Incentives | | $131,891 |
| Annual Operating Savings | | $14,299 |
| **Simple Payback, Years (w/o incentives)** | | **9.2** |
| **Simple Payback, Years (with incentives)** | | **9.2** |

Additional costs over and above basic CHP system costs (e.g., fuel cleanup equipment)
Drop down Yes/No not in default
*Examples of avoided equipment credits are costs for planned boiler additions or back-up generators that are not needed with implementation of a CHP system

**Incentive payments based on kWh generated can be converted to an upfront payment based on total expected performance payments divided by system capacity

| Operating Costs to Generate | |
|---|---|
| Fuel Costs, $/kWh | 0.0617 |
| Thermal Credit, $/kWh | ($0.0412) |
| Incremental O&M, $/kWh | 0.0240 |
| **Total Operating Costs to Generate, $/kWh** | **$0.044** |

**Sensitivity Analysis - Simple Payback**

| Electric Price, $/kWh | | -15% | Base | 15% | Fuel Price, $/MMBtu |
|---|---|---|---|---|---|
| -15% | | 4.0 | 4.0 | 4.0 | Simple Payback w/o ITC |
| Base | | 4.0 | 4.0 | 4.0 | |
| 15% | | 4.0 | 4.0 | 4.0 | |

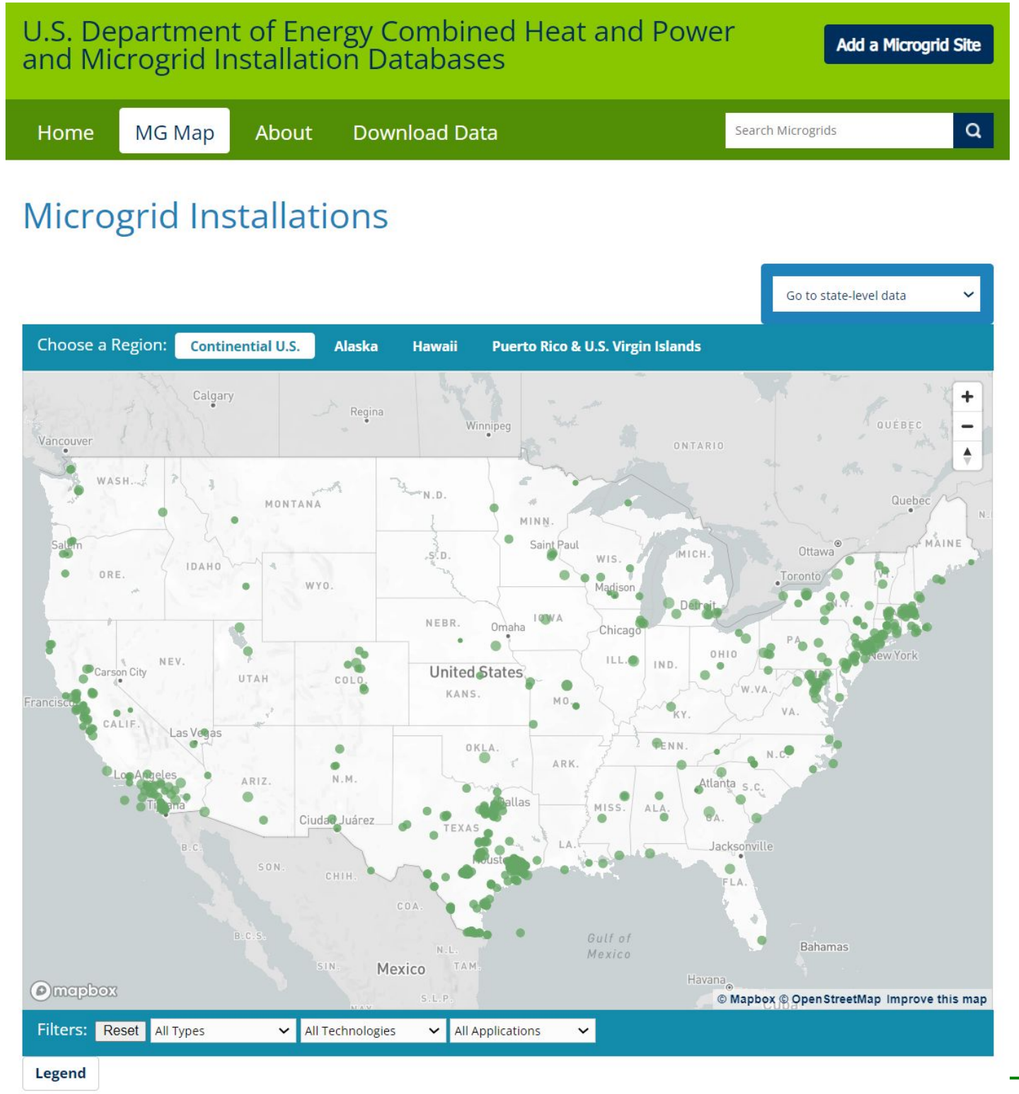
Enter electricitry ar table cells above

Notes:

# Additional Resources

CHP Microgrids

# Microgrid Installation Database




- **In 2021, DOE Launched the Microgrid Installation Database website**
  - **How are CHP systems and other Distributed Energy Resources (DERs) like solar and storage used in microgrids?**
  - **Database tracks microgrid installations across the U.S. with information on system sizes, locations, technologies, and fuels used**
  - **Over 680 microgrids with 4.3 GW total capacity**
  - **Market trend analysis**
    - ***Microgrid applications***
    - ***Technologies used***
    - ***Resilience benefits***
    - ***Common technology combinations***

**CHP and Microgrid Databases** April 1 – June 30, 2022

- Over 940 users/month
- Over 1,300 sessions/month
- Over 2,770 page

# CHP Microgrid Resources

- **U.S. Department of Energy** www.energy.gov
  - **CHP Technical Assistance Partnerships** https://betterbuildingssolutioncenter.energy.gov/chp/chp-taps
  - **Better Buildings CHP for Resilience Accelerator** https://betterbuildingssolutioncenter.energy.gov/accelerators/combined-heat-and-power-resiliency
  - **DG for Resilience Planning Guide: Microgrids 101** https://resilienceguide.dg.industrialenergytools.com/microgrids
  - **DOE Office of Electricity: How Microgrids Work** https://www.energy.gov/articles/how-microgrids-work
  - **Microgrids at Berkeley Lab** https://building-microgrid.lbl.gov/

# CHP Microgrid Resources (continued)

- International District Energy Association https://www.districtenergy.org/home
- Microgrid Resources Coalition http://www.microgridresources.com/home
- The Microgrid Institute http://www.microgridinstitute.org/
- Microgrid Knowledge https://microgridknowledge.com/
- HOMER Energy https://www.homerenergy.com/

# Thank You!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# *Upcoming Technical Assistance*

## Office Hours with DOE Contractors

February 23, 9AM-10AM - Zoom registration

March 22, 10AM-11AM - Zoom registration


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